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IN THE CLAIMS

Please amend the claims as follows:

1. (original) A method of multi-dimensionally encoding a user data stream of user words into a channel data stream of channel words evolving in a one-dimensional direction of infinite extent, wherein:

- a user word is encoded into an NRZ channel word by selecting said NRZ channel word from a code table depending on said user word and the current state of an underlying finite-state-machine, wherein an NRZ channel word comprises a sequence of NRZ channel symbols of NRZ channel bits having a one-dimensional interpretation along said one-dimensional direction and wherein states of an underlying finite-state-machine describing the characteristics of the multi-dimensional code are defined by NRZI channel bits of the previous channel word and by NRZ channel symbols of the current channel word,
- the NRZ channel symbols are transcoded into NRZI channel symbols by a one-dimensional 1T-precoding operation including an integration modulo 2, said 1T-precoding operation being carried out along said one-dimensional direction of infinite extent, and

- said finite-state-machine is put into a new state selected from said code table depending on said user word and the current state of said finite-state-machine together with encoding a user word into a channel word.

2. (original) A method according to claim 1, wherein said method is used for two-dimensionally encoding a user data stream of user words into a channel data stream of channel words along a strip of infinite extent in a first direction of a two-dimensional lattice of channel bits and of finite extent in a second direction orthogonal to said first direction, said strip comprising a number of rows of channel bits with the rows aligned along said first direction,
wherein each NRZ channel symbol comprises exactly one NRZ channel bit for each row in the strip, the NRZ channel bits having a one-dimensional interpretation for each individual row along the direction of the row in said strip, and
wherein the NRZ channel symbols are transcoded into NRZI channel symbols by a row-wise one-dimensional 1T-precoding operation comprising an integration modulo 2, along each of said individual rows of said strip.

3. (original) A method according to claim 2,

wherein the NRZ channel symbols are transcoded into NRZI channel symbols by means of a one-dimensional 1T-precoder such that the NRZI channel bits inside the strip satisfy coding constraints that have two-dimensional characteristics.

4. (original) A method according to claim 2, wherein the running digital sum of at least one row in said strip is controlled separately from the running digital sum of other rows in said strip.

5. (original) A method according to claim 2, wherein the overall running digital sum of all rows of said strip is controlled, in particular by averaging the running digital sums calculated for each row in said strip separately.

6. (currently amended) A method according to claim 4~~ or 5~~, wherein the averaged running digital sum of said strip is controlled for generating a desired spectral behaviour for the strip as a whole, or wherein a number of the running digital sums for a number of rows in the strip are controlled for generating a desired spectral behaviour defined for each of the rows in the strip of said number independently.

7. (original) A method according to claim 2, wherein the running digital sum is controlled at predetermined control points in the channel data stream and wherein said control is accomplished by selection of a particular substitution channel word out of a set of substitution channel words.

8. (original) A method of multi-dimensionally decoding a channel data stream of channel words into which user words of a user data stream are encoded, said channel data stream evolving in a one-dimensional direction of infinite extent, wherein:

- the NRZI channel symbols are transcoded into NRZ channel symbols by an operation reverse to a one-dimensional 1T-precoding operation including an integration modulo 2, said reverse operation comprising at least a differentiation operation, wherein an NRZ channel word comprises a sequence of NRZ channel symbols of NRZ channel bits having a one-dimensional interpretation along said one-dimensional direction and wherein states of an underlying finite-state-machine describing the characteristics of the multi-dimensional code are defined by NRZI channel bits of the previous channel word and by NRZ channel symbols of the current channel word, and
- the NRZ channel word is decoded into a user word by selecting said user word from a code table depending on said NRZ

channel word and the next-state of said underlying finite-state-machine at which the next user word in said user data stream has been encoded, wherein said next-state of a current channel word of said underlying finite-state-machine is defined by NRZI channel bits of the current channel word and by NRZ channel symbols of the next channel word.

9. (original) A method according to claim 8,
wherein said method is used for two-dimensionally decoding a channel data stream of channel words into which user words of a user data stream are encoded along a strip of infinite extent in a first direction of a two-dimensional lattice of channel bits and of finite extent in a second direction orthogonal to said first direction, said strip comprising a number of rows of channel bits with the rows aligned along said first direction,
wherein the NRZI channel symbols are transcoded into NRZ channel symbols by a row-wise operation reverse to said one-dimensional 1T-precoding operation which includes said integration modulo 2, said reverse operation comprising at least a differentiation operation,said row-wise operation being carried out along each of said individual rows of said strip, and
wherein each NRZ channel symbol comprises exactly one NRZ channel bit for each row in the strip, the NRZ channel bits having a one-

dimensional interpretation for each individual row along the direction of the row in said strip.

10. (original) A method according to claim 9, wherein said next-state of said finite-state-machine is obtained by determining the STD-state of one or more of the last NRZI channel symbols of the current channel word and by determining the value of a number of the NRZ channel symbols comprising exactly one NRZ bit for each row in the strip, obtained from the next channel word.

11. (currently amended) A method according to claim 2~~ or 9~~, wherein the individual NRZ channel bits of a channel word have a one-dimensional interpretation along the direction of a row in said strip such that bit value one represents the presence of a transition in the binary waveform along said row in said strip and that bit value zero represents the absence of a transition in the binary waveform along said row in said strip.

12. (currently amended) A method according to claim 2~~ or 9~~, wherein the NRZI channel bits are arranged on the lattice points of a quasi-hexagonal lattice consisting of lattice clusters each consisting of one central bit and six nearest neighbouring bits.

13. (original) A method according to claim 12, wherein a first code constraint is applied on each of said lattice clusters such that for each of said lattice clusters a predetermined minimum number, in particular at least one, of said nearest neighbouring NRZI bits are of the same NRZI bit state as said central NRZI bit.

14. (currently amended) A method according to claim 2~~ or 9~~, wherein the NRZI channel bits are arranged on the lattice points of a quasi-square lattice.

15. (currently amended) A method according to claim 2~~ or 9~~, wherein the NRZI channel bits are arranged on the lattice points of a quasi-rectangular lattice.

16. (currently amended) A method according to claim 2~~ or 9~~, wherein said channel data stream comprises three rows of channel bits along a two-dimensional strip and wherein 11 user bits are encoded into 12 channel bits arranged along said strip in four channel bit-triplets each forming an 8-ary channel symbol.

17. (currently amended) A method according to claim 2~~ or 9~~,

wherein said channel data stream comprises five rows of channel bits along a two-dimensional strip and wherein 14 user bits are encoded into 15 channel bits arranged along said strip in three channel bit 5-tuples each forming a 32-ary channel symbol.

18. (currently amended) A method according to claim 1~~ or 8~~, wherein said finite-state-machine (FSM) is defined based on the different possible STD-states an NRZI channel symbol can take, whereby the STD-states cover both overall polarities of the NRZI channel symbol as a whole, said finite-state-machine being able to take different FSM-states which are defined dependent on one or more related STD-states of one or more of the last NRZI channel symbols of a previous channel word and the value of the NRZ bits and symbols of the current channel word.

19. (currently amended) A method according to claim 16~~ and 18~~, wherein a next-state of said finite-state-machine is defined dependent on one or more related STD-states of at maximum two of the last NRZI channel symbols of a current channel word and the value of the NRZ bits of at maximum three channel symbols of the next channel word.

20. (currently amended) A method according to claim 1~~ or 8~~,

wherein channel words not used for control of the running digital sum constitute code tables of a main code and a complete table of pairs of substitution channel words, one pair of channel words for each user word, used for control of the running digital sum constitute a substitution code being different from said main code, wherein for each user word a set of at least two substitution channel words including a parity vector having complementary parities is provided in a substitution code table and wherein to each of said at least two substitution channel words the same next-state of a finite-state-machine for said substitution code is assigned.

21. (original) A method according to claim 20,
wherein 7 user bits are encoded into 9 substitution-word channel bits of a substitution channel word arranged along said strip in three channel bit-triplets each forming an 8-ary substitution channel symbol.

22. (original) A method according to claim 21,
wherein the underlying finite-state-machine of said substitution channel code is different from the underlying finite-state-machine of said main channel code, in particular are the FSM-states defined

dependent on different values of the NRZ channel symbols of the next channel word.

23. (currently amended) A method according to claim 1~~ or 8~~, wherein

- bulk clusters are defined comprising a central bit and a number of nearest neighbouring bits,
- boundary clusters are defined comprising a boundary bit and a number of nearest neighbouring bits,
- a bulk cluster constraint is applied to said bulk clusters defining the minimum number of said nearest neighbouring bits having the same bit state as the central bit of the respective bulk cluster, and
- a boundary cluster constraint is applied to said boundary clusters defining the minimum number of said nearest neighbouring bits having the same bit state as the central bit of the respective boundary cluster.

24. (original) A method according to claim 23, wherein synchronisation patterns are embedded in the channel data stream by introducing violations of said boundary cluster constraint such that said bulk cluster constraint across a boundary is not violated.

25. (currently amended) A method according to claim 2~~ or 9 and claim 24~~,

wherein said synchronisation pattern comprises at least one 2T mark across a boundary between two strips, in particular two 2T marks under different inclinations with the direction of infinite extent of said strips.

26. (original) A method according to claim 25,

wherein said synchronisation pattern comprises six consecutive channel symbols in each strip.

27. (original) A method according to claim 26,

wherein free channel bits of a synchronisation pattern are used to characterize the synchronisation patterns of different channel data frames by different synchronisation colours by setting a number of said free channel bits to predetermined values.

28. (original) Apparatus for multi-dimensionally encoding a user data stream of user words into a channel data stream of channel words evolving in a one-dimensional direction of infinite extent, wherein:

- a mapping unit for encoding a user word into an NRZ

channel word by selecting said NRZ channel word from a code table depending on said user word and the current state of an underlying finite-state-machine, wherein an NRZ channel word comprises a sequence of NRZ channel symbols of NRZ channel bits having a one-dimensional interpretation along said one-dimensional direction and wherein states of an underlying finite-state-machine describing the characteristics of the multi-dimensional code are defined by NRZI channel bits of the previous channel word and by NRZ channel symbols of the current channel word,

- a channel word conversion unit for transcoding the NRZ channel symbols into NRZI channel symbols by a one-dimensional 1T-precoding operation including an integration modulo 2, said 1T-precoding operation being carried out along said one-dimensional direction of infinite extent, and
- a state conversion unit for putting said finite-state-machine into a new state selected from said code table depending on said user word and the current state of said finite-state-machine together with encoding a user word into a channel word.

29. (original) Apparatus for multi-dimensionally decoding a channel data stream of channel words into which user words of a user data stream are encoded, said channel data stream evolving in a one-dimensional direction of infinite extent, wherein:

- a channel word conversion unit for transcoding the NRZI channel symbols into NRZ channel symbols by an operation reverse to a one-dimensional 1T-precoding operation including an integration modulo 2, said reverse operation comprising at least a differentiation operation, wherein an NRZ channel word comprises a sequence of NRZ channel symbols of NRZ channel bits having a one-dimensional interpretation along said one-dimensional direction and wherein states of an underlying finite-state-machine describing the characteristics of the multi-dimensional code are defined by NRZI channel bits of the previous channel word and by NRZ channel symbols of the current channel word, and
- a mapping unit for decoding the NRZ channel word is decoded into a user word by selecting said user word from a code table depending on said NRZ channel word and the next-state of said underlying finite-state-machine at which the next user word in said user data stream has been encoded, wherein said next-state of a current channel word of said underlying finite-state-machine is defined by NRZI channel bits of the current channel word and by NRZ channel symbols of the next channel word.

30. (original) Storage medium storing data in form of code words encoded according to a method of claim 1, wherein a user data stream of user words is multi-dimensionally encoded into a channel

data stream of channel words evolving in a one-dimensional direction of infinite extent.

31. (original) Signal comprising data in form of code words encoded according to a method of claim 1, wherein a user data stream of user words is multi-dimensionally encoded into a channel data stream of channel words evolving in a one-dimensional direction of infinite extent.

32. (original) Computer program comprising program code means for causing a computer to implement the steps of the method of claim 1 or 8 when said program is run on a computer.